GEMS RFI/Industry Day

SND C2 SPO

Ground Element Minimum Essential Emergency Communications Network (MEECN) System (GEMS)

Strategic and Nuclear Deterrence Command and Control System Program Office
Electronic Systems Center – Air Force Materiel Command (AFMC)
Hanscom Air Force Base, MA 01731

Rules of Engagement

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- RFI/Industry Day is **not** a solicitation to bid or a Request for Proposal
- No contractual obligation exists between any parties
- Government will not be locked into any requirements presented here today
  - ORD is a working draft -- IT WILL CHANGE
  - Funding profiles change
- Ensure mitigation plans exist for potential Organizational Conflict of Interest issues prior to RFP

Rules of Engagement

- Private sessions are for proprietary discussions
  - Impartiality and fairness extended to all parties
  - Questions pertaining to clarification of GEMS ORD requirements will be publicly released
  - **<u>Proprietary information will be protected</u>**
    - Firms must identify their presentation as proprietary

Schedule

- **Tues, 6 Aug 02 (Open Session)**
  - **0800-0830 Registration**
  - **0830-0850 Admin/Introduction/Goals**
  - **0850-0900 MEECN Overview**
  - **0900-0930 Current Concept of Operations**
  - **0945-0955 GEMS Mission Requirements**
  - **0955-1000 GEMS Funding/Fielding**
  - **1000-1100 GEMS Technical Requirements**
  - **1115-1130 Questions for Industry/Report Guidelines**
  - **1130-1200 Wrap Up/Q&A**

- Open session discussions will be unclassified

Schedule

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- Wed/Thurs, 7-8 Aug 02 (Private Sessions)
  - 75 minute blocks starting at 0800, 0930, 1100, 1300, 1430, 1600
    - Individual appointment date/time provided upon request
  - Proprietary/confidential discussions
  - Location
    - 6 Aug: Bldg 1618, Rm 201
    - 7-8 Aug; Bldg 1618, Rm 117
  - PC/Projector available for presentations
  - Security clearance info must be received prior to session in order to discuss classified items
    - FAX to 781-377-8705 Attn: Capt Salmon or George Weinstein
    - Phone: 781-377-1472

GEMS Program Office

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- Program Management
  - MEECN Division Chief – Lt Col Tony Cerveny
  - Messaging Sys Branch Chief – GS-13 Michael La Mesa
  - GEMS Program Manager – 1Lt Marisa Rucker
  - GEMS Deputy Program Manager – 2Lt Will Southard
- Contracting
  - PCO – GS-13 Kathy Viano
  - Buyer – GS-9 Joe Pianese
- Engineering
  - Chief Engineer – Dr Maurice Fitzgerald

RFI/Industry Day Goals

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- Market research
  - Explore existing technologies that might meet requirements
  - Exploit synergies with existing terminals; integrate and upgrade vs. design from scratch
- Identify program and technical risks
- Feedback/suggestions from the experts
  - How would you design, integrate, implement, test, deploy, train, and support?
  - How would you use evolutionary acquisition and spiral development?
  - How long would it take? *Rough* cost estimate?
  - Issues with ORD?
- Specific questions will be highlighted during briefs

Evolutionary Acquisition Strategy and Spiral Development

What do we mean by "Evolutionary Acquisition Strategy?"

ev·o·lu·tion *n.* 1. Any process of formation or growth; development.

ac·quire *n.* 1. The act of gaining delivering warfighting capability

strat·e·gy *n.* 4. A plan or method for achieving a specific goal.

Plans to develop and deliver incremental warfighting capability over time

Source: Air Force Institute of Technology

Evolutionary Acquisition Defined

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An acquisition strategy that defines, develops, produces or acquires, and fields an initial hardware or software increment (or block) of operational capability.

It is based on technologies demonstrated in the relevant environments, time-phased requirements, and demonstrated manufacturing or software deployment capabilities.

These capabilities can be provided in a shorter period of time, followed by subsequent increments of capability over time that accommodate improved technology and allowing full and adaptable systems over time.

Mr. Aldridge, USD AT&L
Memo to Services, April 12, 2002

Source: Air Force Institute of Technology

Call for a New Approach

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"get new capabilities to the warfighter even faster …

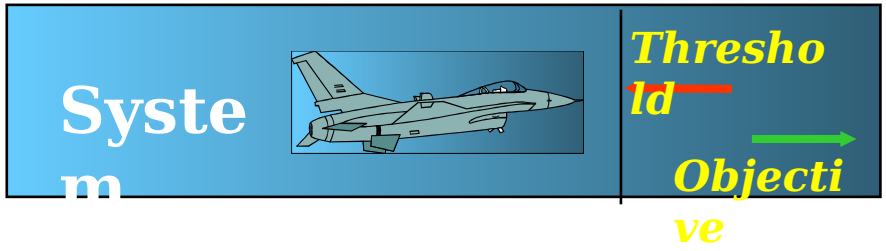
… fielding new systems with some but not all of the their ultimate features …

… and adding new technologies in block upgrades as they become available"

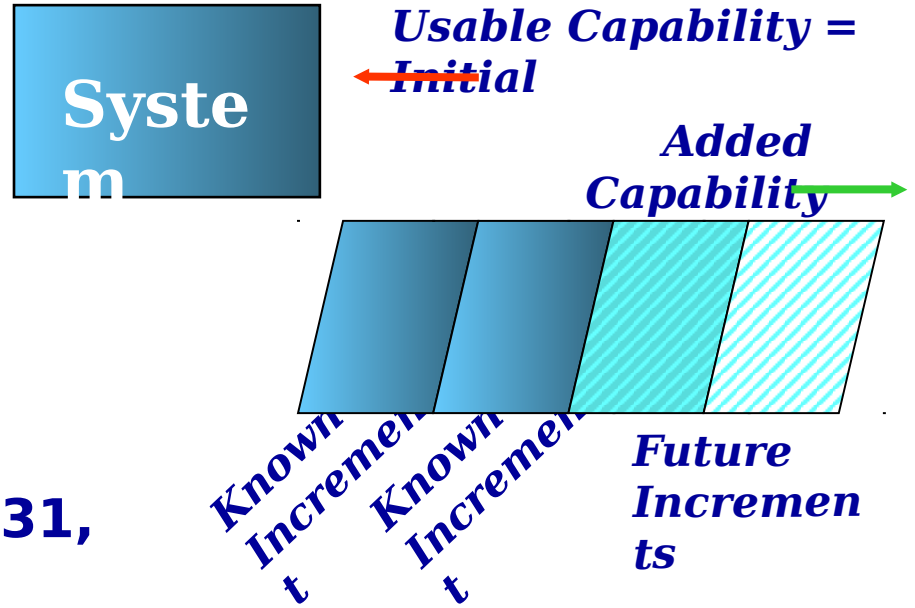
Mr. Aldridge, USD AT&L

***InsideDefense.com*, October 31, 2001**

Traditional Single-step Acq



Evolutionary Acquisitio



Source: Air Force Institute of Technology

Spiral Development Defined

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An iterative process for developing a defined set of capabilities within one increment.

This process provides the opportunity for interaction between the user, tester, and developer. In this process, the requirements are refined through experimentation and risk management, there is continuous feedback, and the user is provided the best possible capability within the increment.

Each increment may include a number of spirals. Spiral development implements evolutionary acquisition.

Mr. Aldridge, USD AT&L

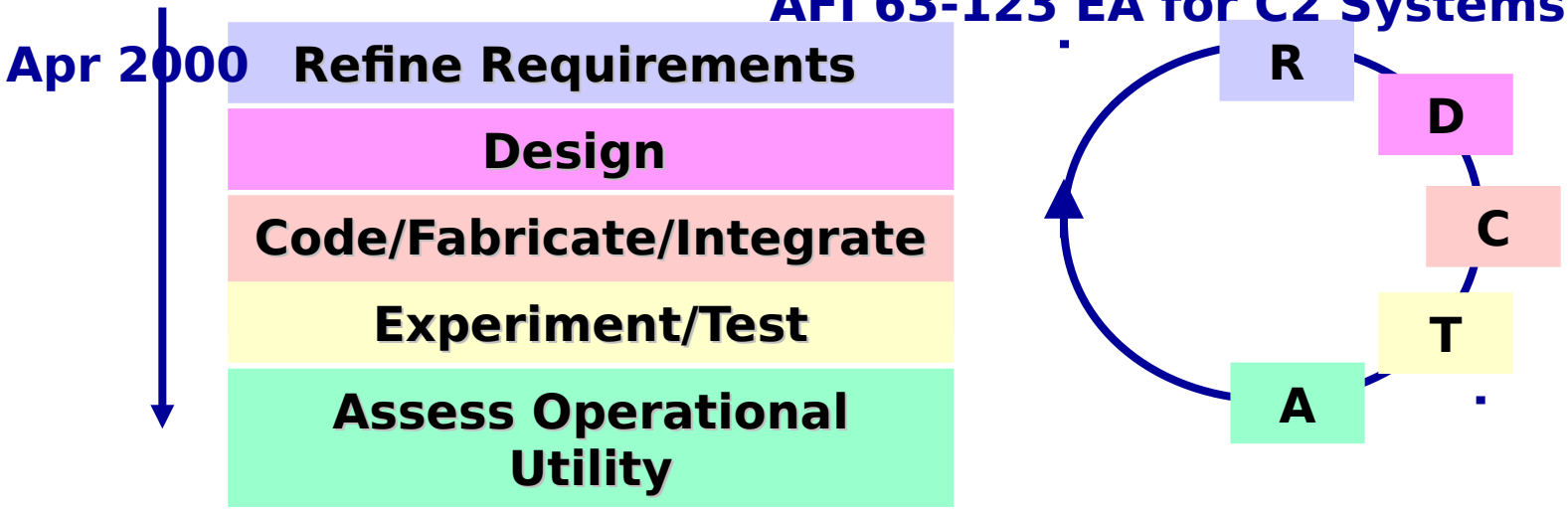
Memo to Services, April 12, 2002

Source: Air Force Institute of Technology

Single Spiral

A sub-process which may include: establishing performance objectives; designing; coding/fabricating/integrating; experimenting; testing; assessing operational utility; making tradeoffs; and delivering.

AFI 63-123 EA for C2 Systems, 1



ADDITIONAL INFORMATION AVAILABLE ON HERBB

Source: Air Force Institute of Technology

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Minimum Essential Emergency Communication Network (MEECN)

Lt Col Anthony Cerveny
MEECN Division Chief

MEECN Description

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Mission:

- Provide survivable, high fidelity, secure, jam resistant communications linking the President to the Strategic Nuclear Forces throughout all phases of strategic conflict.

- **Acquisition Programs**
  - Minuteman MEECN Program (MMP)
  - Modified Miniature Receive Terminal (MMRT)
- **Sustainment Programs**
  - Defense IEMATS Replacement Command and Control Terminal (DIRECT)
  - Miniature Receive Terminal (MRT)
  - Survivable Low Frequency Communications System (SLFCS)
  - MEECN Continuing Evaluation Program (CEP)

- **Future Programs**
  - Crypto Modernization
  - Ground Element MEECN System (GEMS)
  - Advanced EHF (MMP)

MEECN Capabilities

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CINC Command

DIRECT

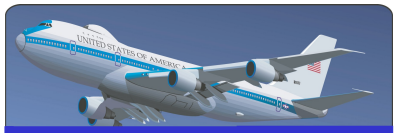
TACAMO E-

MMRT

Enhanced VERDIN System (EVS) TX

DIRECT*

NAOC E-4



MMRT

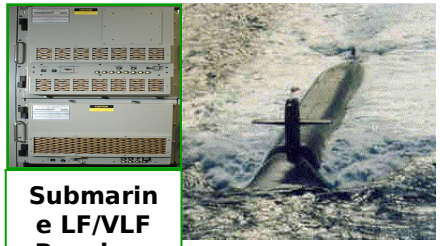
High Power Transmit Set

DIRECT*

* *Potential future expansion*

B-2

Airborne Wideband Terminal (AWT)



Submarine LF/VLF Receiver (SLVR)

SSBN/SSN

ICBM

MMP

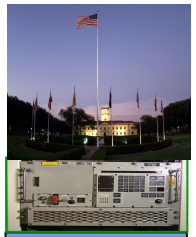
AEHF

B-52

Airborne Wideband Terminal (AWT)

MRT

WING COMMAND POSTS



Ground Element MEECN System (GEMS)

FORWARD OPERATING LOCATIONS

Ground Element MEECN System (GEMS)

MEECN User OPRs

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CINC Command

DIRECT

USER OPR: AFSPC/SC

NAOC E-4

MMRT

USER OPR: AFC2ISRC/A-38

TACAMO E-

MMRT

USER OPR: Navy PMA-271

MMP

ICBM

USER OPR: AFSPC/DR

MRT

USER OPR: ACC/DRA52

WING COMMAND POSTS

Ground Element MEECN System (GEMS)

FORWARD OPERATING LOCATIONS

Ground Element MEECN System (GEMS)

USER OPR: AFC2ISRC/A-61

Operations Brief

Existing System Concept of Operations

TSgt Stammers, ACC/DONC

Mr. Poplin (DRC) / Ms. Kroskey (ARINC)

Overview

- Existing systems
  - Aircrew Alerting Communications EMP (AACE)
  - EMP Hardened Dispersal Communications (EHDC)
  - Single Channel Anti-jam Man Portable (SCAMP)
    - Fixed / Mobile
- Concept of Operations
- Operations Scenarios
- User Profiles
- Problems/Issues

AACE

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- Provides EMP protected fixed site aircrew alerting
- Nine operational sites
- AFSAT/Milstar/UHF LOS/Klaxon/Pagers
- Supports USSTRATCOM survival of forces/force direction

EMP Shelter

EMP Console

Klaxon/Pagers

AACE

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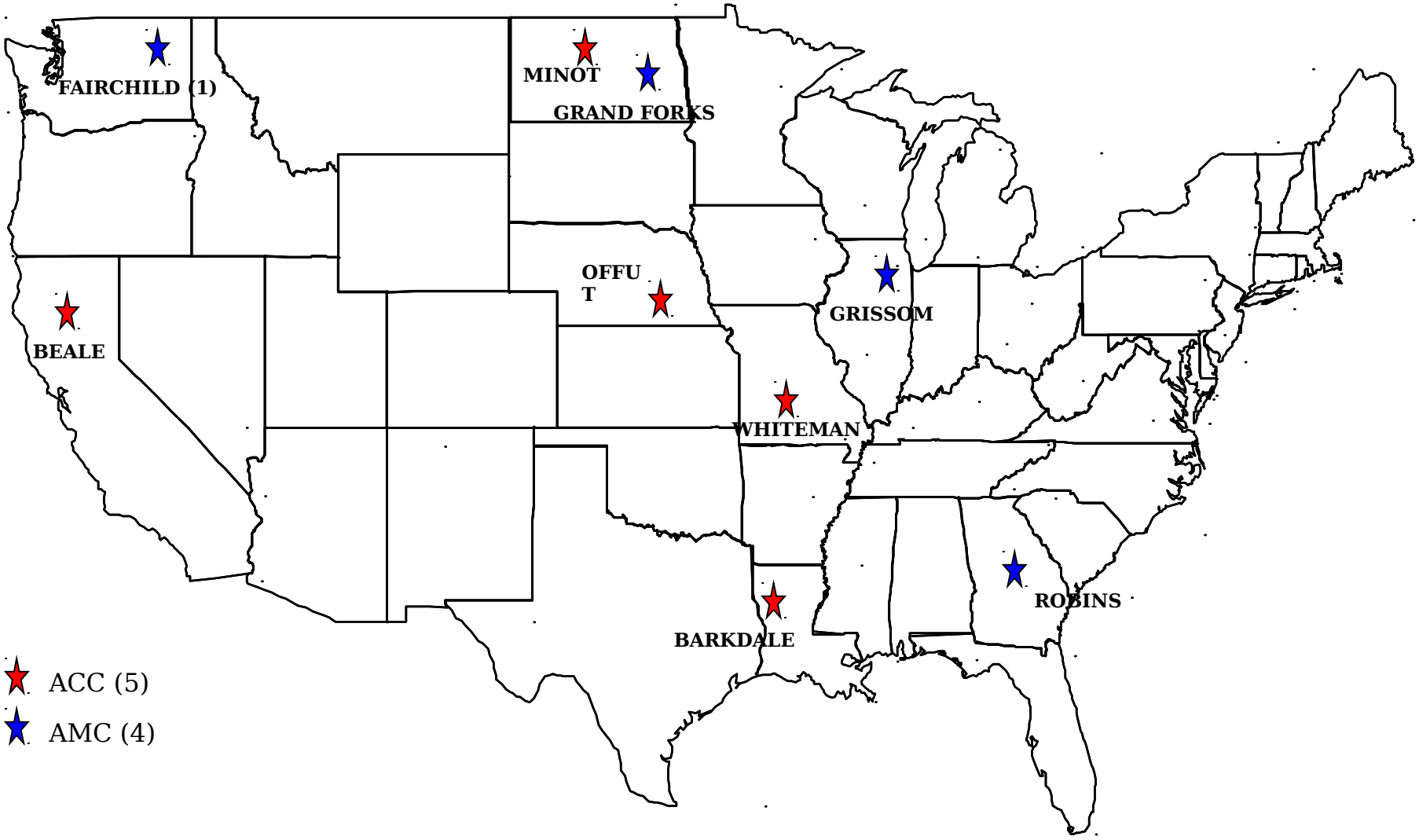


EHDC

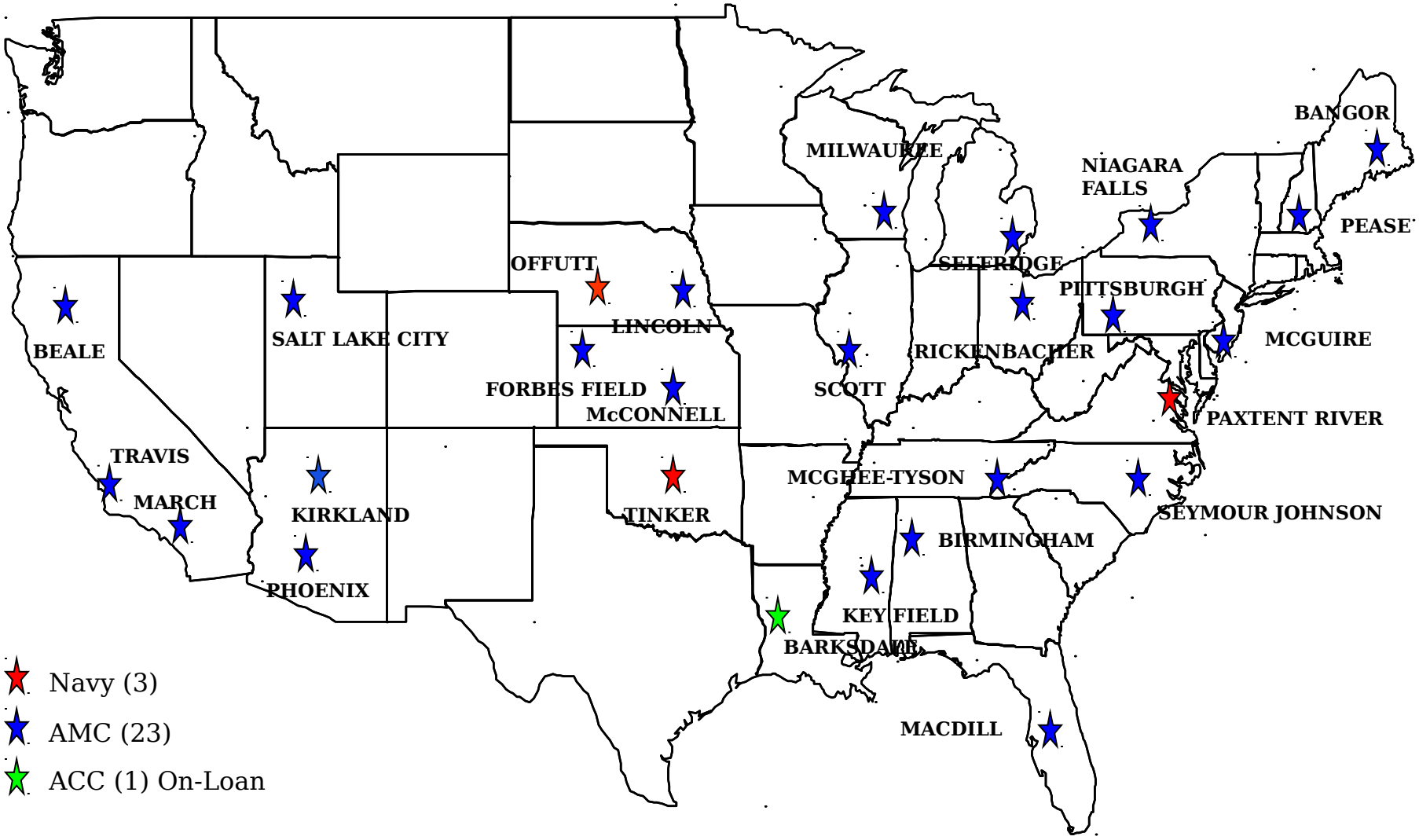
- Provides Fixed/Deployable EMP protected aircrew alerting (AMC/Navy)
- 26 suites
- UHF LOS/Klaxon/Pagers
- Supports USSTRATCOM survival of forces/force direction

EHDC Console

EHDC Pagers

EHDC

SND C2 SPO



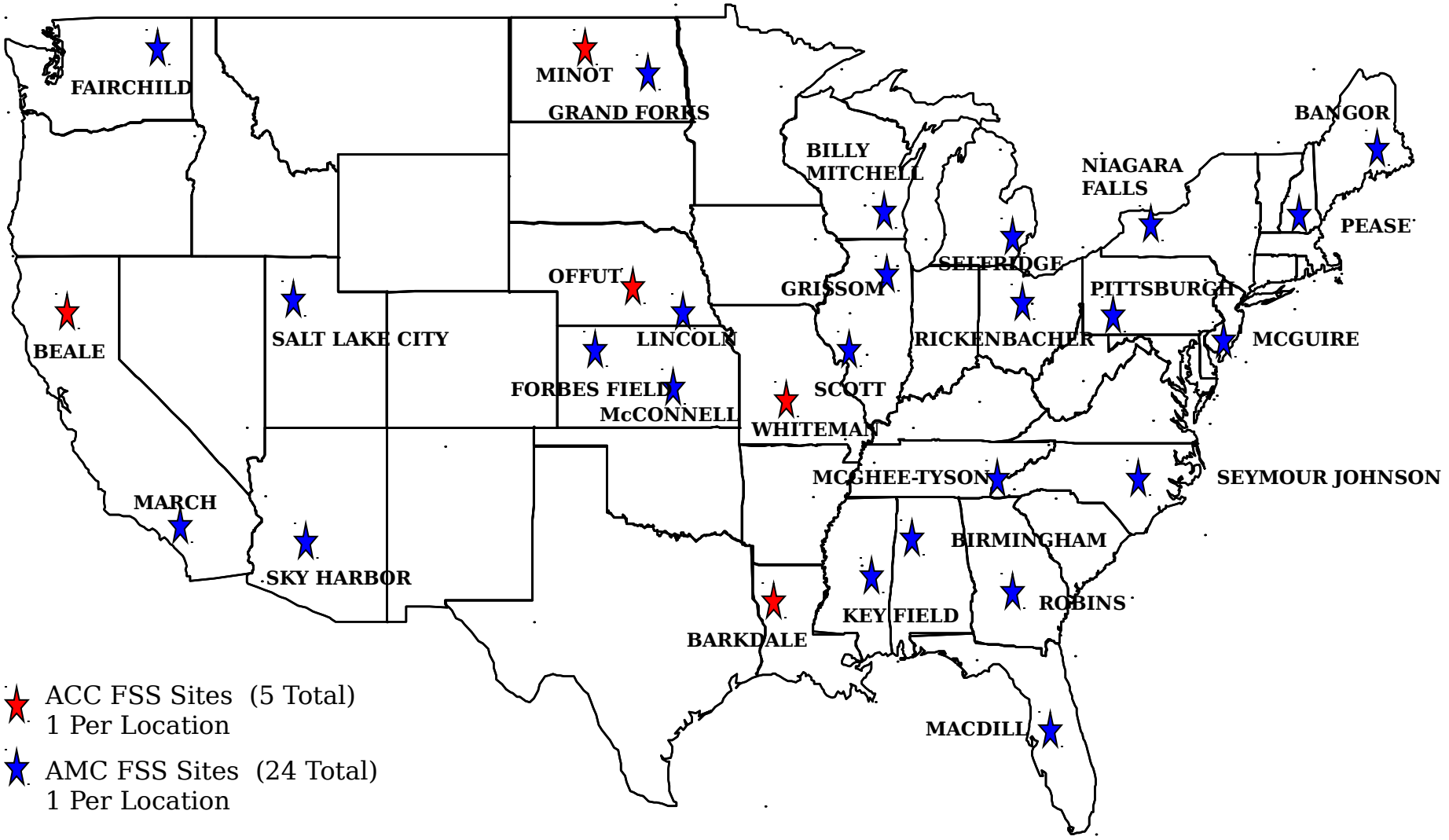
SCAMP

- Provides survivable and endurable Force Direction, Force Management, and Situational Monitoring to NC2 forces
- 29 FSS's (ACC-5/AMC-24) located Strategic Wing Command Posts
- 56 (ACC-22/AMC-26/Navy-8) Mobile SCAMPs provide connectivity for bomber, reconnaissance, tanker, Navy support teams

Fixed Site SCAMP

Mobile SCAMP

FSS


FAIRCHILD
MINOT
GRAND FORKS
BILLY MITCHELL
BANGOR
NIAGARA FALLS
PEASE
SELFRIDGE
OFFUT
GRISSOM
PITTSBURGH
BEALE
SALT LAKE CITY
LINCOLN
RICKENBACHER
MCGUIRE
FORBES FIELD
McCONNELL
SCOTT
WHITEMAN
MCGHEE-TYSON
SEYMOUR JOHNSON
MARCH
SKY HARBOR
BIRMINGHAM
KEY FIELD
ROBINS
BARKDALE
MACDILL
ACC FSS Sites (5 Total)
1 Per Location
AMC FSS Sites (24 Total)
1 Per Location

Mobile SCAMP

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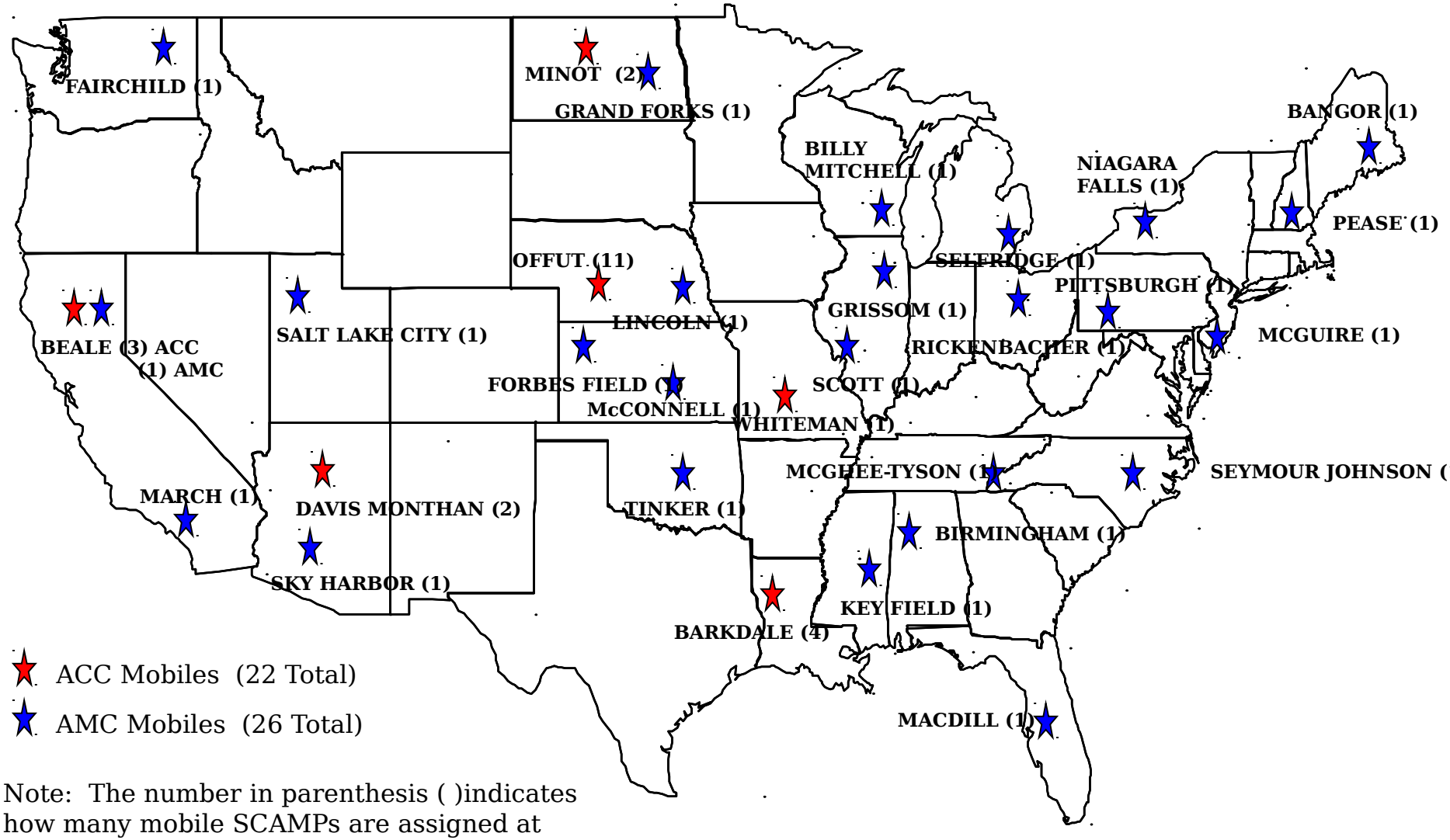

ACC Mobiles (22 Total)

AMC Mobiles (26 Total)

Note: The number in parenthesis ( )indicates how many mobile SCAMPs are assigned at each location.

High Level CONOPS

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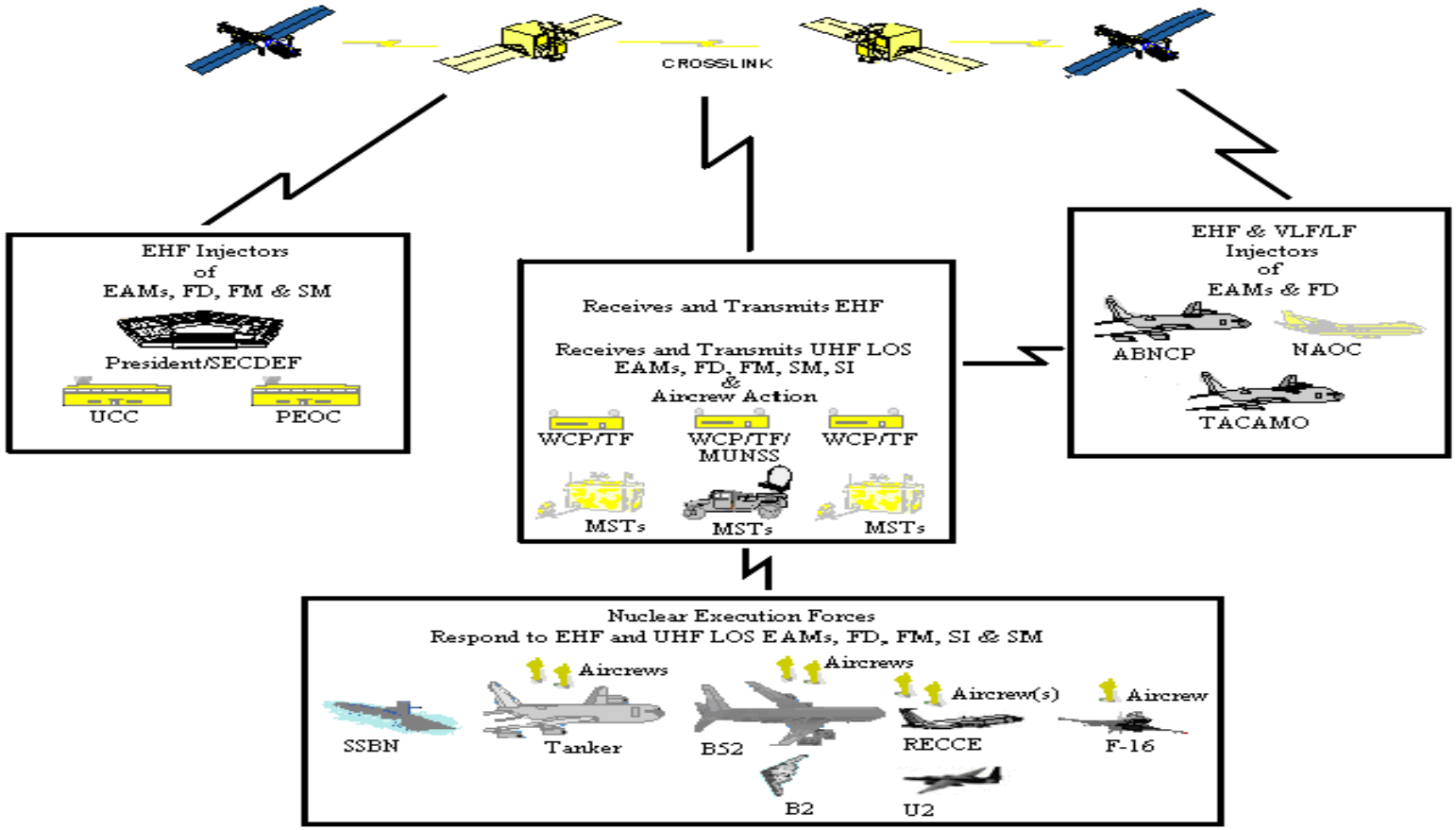

ABNCP - Airborne Command Post
FD - Force Direction
MSTs - Mobile Support Teams
PEOC - Primary European Operations Center
SM - Situation Monitoring
TF - Task Force

EAMs - Emergency Action Messages
FM - Management
MUNSS - Munitions Support Squadron
SECDEF - Secretary of Defense
SSBN - Strategic Submarine Ballistic Nuclear
UCC - Unified Combatant Command
VLF/LF - Very Low Frequency/Low Frequency

EHF - Extremely High Frequency
GEMS - Ground Element MEECN System
NAOC - National Airborne Operations Center
SI - Strategic Intelligence
TACAMO - Take Charge and Move Out
UHF LOS - Ultra High Frequency Line-of-Sight

Operations Scenarios

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- Fixed (24/7 Operations)
  - Receive and process NC2 Orders (Force Direction)
    - Presidential decision through the JCS to the force provider
    - USSTRATCOM to the execution forces
    - CP controllers receive & process message
    - Relay to forces (both airborne and on the ground)
  - Force Management and Situational Awareness
- Mobile (Deployment - Predetermined or New locations)
  - Setup operations
  - Receive and process NC2 Orders (Force Direction)
    - Presidential decision through the JCS to the force provider
    - USSTRATCOM to the execution forces
    - CP controllers receive & process message
    - Relay to forces (both airborne and on the ground)
  - Force Management and Situational Awareness

User Profiles

- Fixed Site User
  - Wing Command Post (CP) Controllers = Not communications technicians/maintenance/repair.
    - Mandatory consoles be manned with 2 controllers per shift
    - Skill level breakout: 784% (3-levels), 89% (5-levels), 73% (7-levels)
    - Dwindling experience levels since SAC disappeared
    - Basic SIOP taught at Joint Nuclear C2 school at Offutt
  - High stress, multi-tasked environment.
  - Two controllers manage a minimum of 11 communication systems
- Mobile User
  - CP Ops personnel (user), comm/nav (maintainer)
  - 4 CP Ops personnel deployed with each terminal for 24-hr ops
    - Goal - CP sole responsibility is terminal operation only

Problems/Issues

- Training (OPS/MX)
  - Command Post
    - Difficult Systems - No Initial Training, No Follow-on Training
    - Relies on Train-the-trainer concept with locally developed OJT
  - Maintainers
    - Hardness Maintenance/Hardness Surveillance (HM/HS)
    - No mock-up / simulators
- Existing Shortfalls and Sustainment Issues
  - No production, limited growth, non-modular
  - Need for modernization (Plug and Play/Expansion)
- Operator Intensive/Maintenance Intensive
  - Transec keys, Image Download, Crypto, HM/HS, TO's

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Mission Requirements

Lt Marisa Rucker
GEMS Program Manager

Background Information

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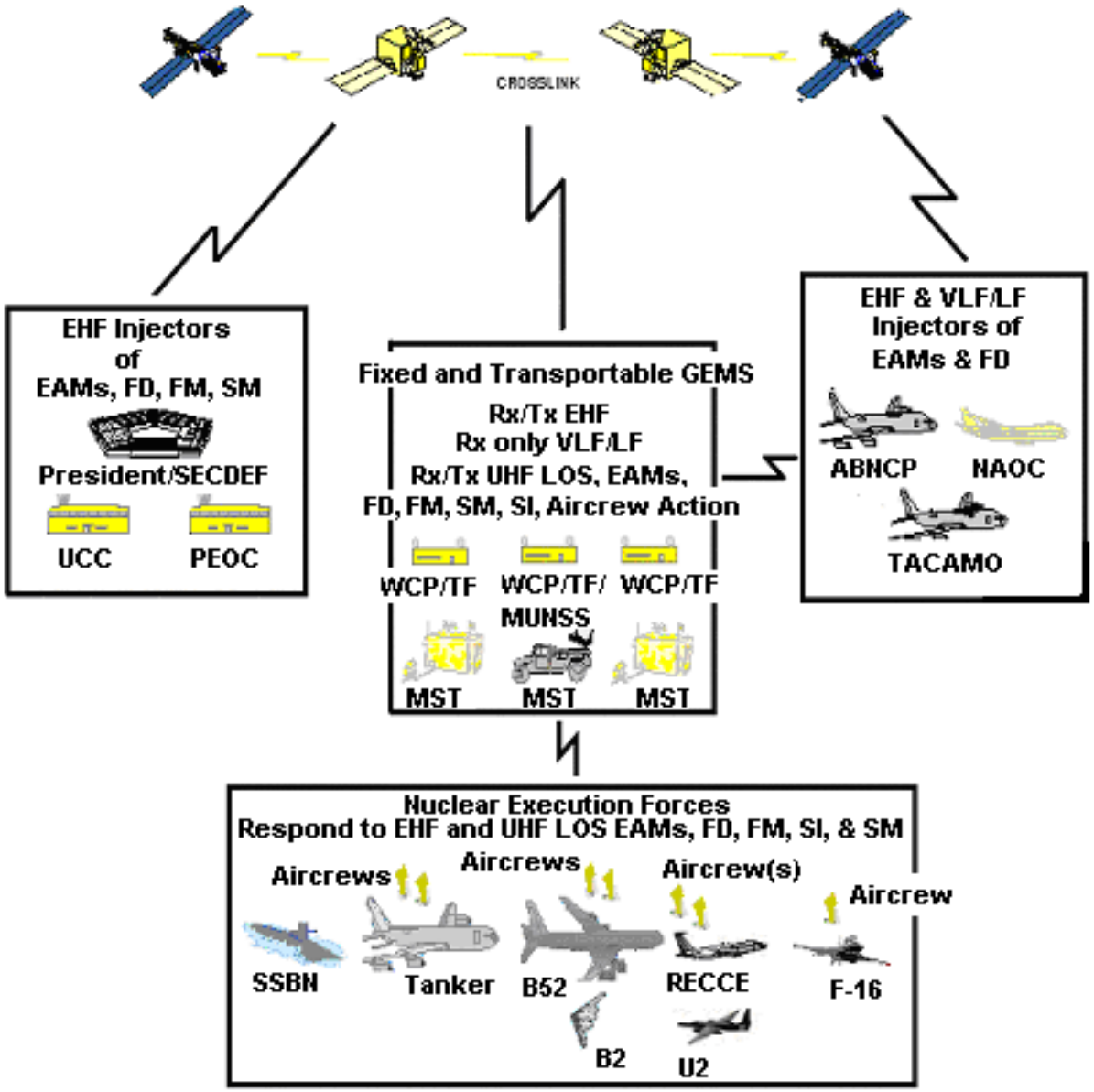
- Program initiation
  - Requirement for survivable inter-site/intra-site strategic comm documented in Multi-Command Mission Need Statement (MNS), CAF-AMC 408-00 dated Jun 01.
  - Mission deficiencies and sustainability problems with current infrastructure

GEMS Description

- High-level system description
  - Survivable means to disseminate EAM and force direction messages from Nuclear Command and Control System (NCCS) nodes to aircrews and nuclear execution ground support forces
  - Replaces SCAMP, AACE, and EHDC systems
- Customers
  - ACC, AMC, USAFE, and Navy wing command posts and mobile support teams supporting dispersed bombers, tankers, and strategic Command and Control (C2) elements

High Level CONOPS



ABNCP - Airborne Command Post
EAM - Emergency Action Message
EHF - Extremely High Frequency
FD - Force Direction
FM - Force Management

GEMS - Ground Element MEECN System
MST - Mobile Support Team
MUNSS - Munitions Support Squadron
NAOC - National Airborne Operations Center
PEOC - Primary European Operations Center

SECDEF - Secretary of Defense
SI - Strategic Intelligence
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SSBN - Strategic Submarine Ballistic Nuclear
TACAMO - Take Charge and Move Out

TF - Task Force
UCC - Unified Combatant Command
UHF LOS - Ultra High Frequency Line-of-Sight
VLF/LF - Very Low Frequency/Low Frequency

Mission Capabilities

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- Survivable force direction, force management, planning, strategic intelligence, and situational monitoring
  - Single operational interface integrating EHF/AEHF, VLF/LF, and UHF LOS/Aircrew Alerting communication
  - Survivable Emergency Action Message dissemination
  - Interoperability with legacy Milstar payloads, MEECN architecture
  - Fixed and transportable, modular/re-configurable elements
  - Input/Output and terminal control remotable
  - Nuclear hardening: HEMP/fallout protection
- Phased Approach (per ORD)
  - Phase I - Milstar EHF and Aircrew Alerting
  - Phase II - AEHF Upgrade
  - Phase III - VLF/LF

TBD

Modular, scalable design with user/mission-defined configurations

Funding

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- ACAT III Program
- Current Funding Profile

	$ (Million)	FY04	FY05	FY06	FY07	FY08	FY09
GEMS	3600		$37.74	$16.03	$4.44	$4.51	$4.61
	3080		$5.09	$42.68	$108.86	$59.76	$19.44

- ***Potential*** Funding Redistribution
  - Redistribution could allow for FY04 contract award
  - Final determination will occur by Mar 03

- Funding details will change
  - Bottom line remains: ***user wants capability quickly***

Fielding

- **SCHEDULE TBD**

- IOC I – Date TBD
  - EHF and Aircrew Alerting

- IOC II – Date TBD
  - AEHF

- FOC – 2010
  - VLF/LF

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Technical Requirements

Dr Maurice Fitzgerald
Chief Engineer

Objective

- Review the high points
  - ORD V 5.0 except where noted
  - Summary not the details
  - Not repeat all ORD requirements
- Provide a structure for you to ask questions

System Architecture Notional View

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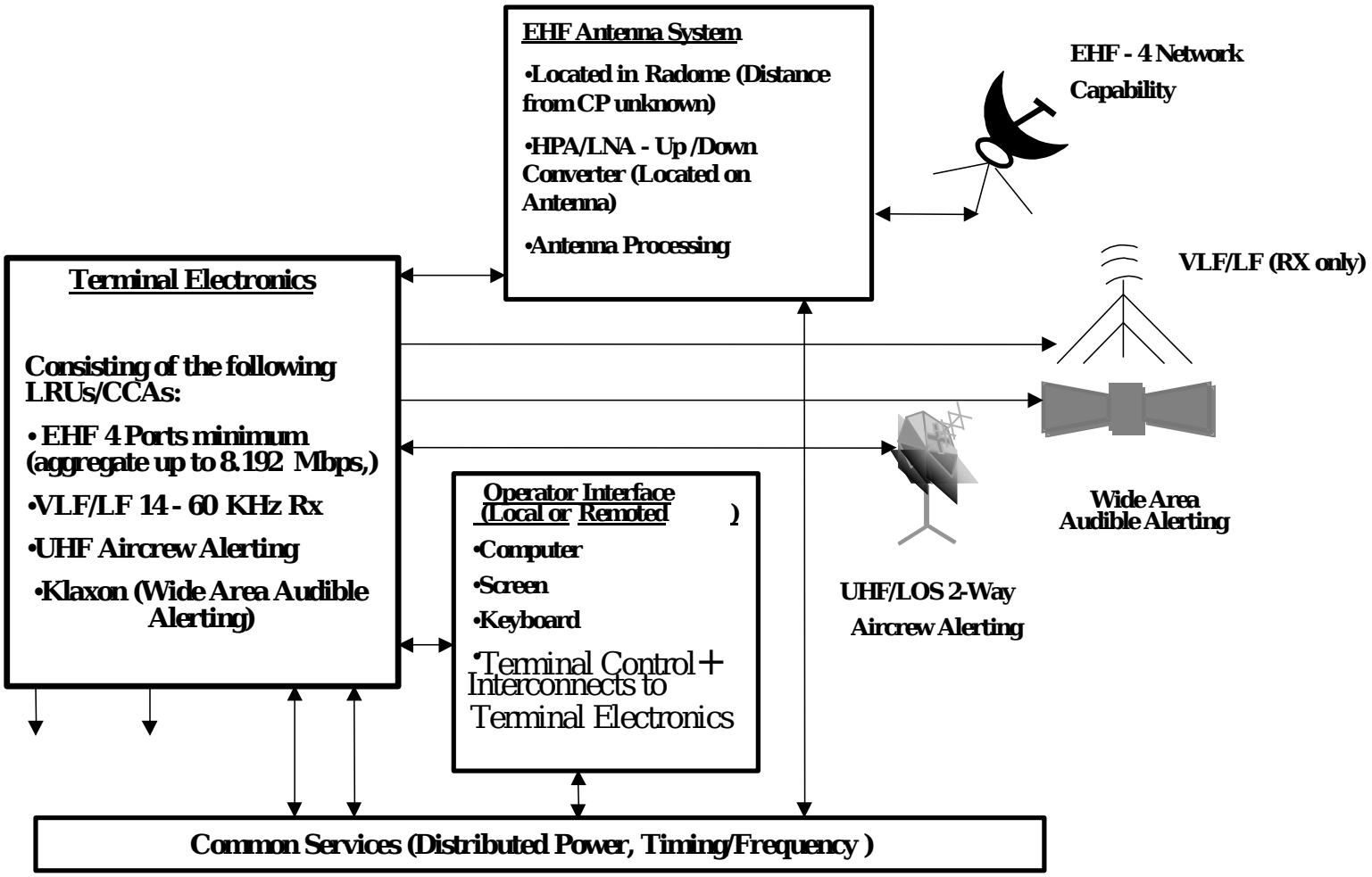
Fixed GEMS



Four Major Terminal Components

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- EHF Terminal
  - Today's Milstar, AEHF, future Transformation
    - User would not delay low data rate Milstar Vs AEHF Vs Transformational SATCOM
- LF/VLF Terminal
  - Today's MEECN Modes, son of HIDAR
- Base Alerting Communication
  - UHF Line-of-sight voice, Pagers, and Klaxons
- Operator interface - highly integrated

EHF Milstar

- Today's LDR channels, tomorrow's MDR and XDR channels
- High data rate ports to feed TBD I/O devices
- EHF Data rates 75 to 19.2 kbps (thr.)
  - 8.192 (obj.); Aggregate 20Mbps (thr.)?
  - Voice and Data
  - 8 red and 8 black ports

VLF/LF

- Single Channel Scanning receiver
  - 14-60 kHz
  - MM 15, MMPM, HIDAR Modes
  - Effective zero synchronization time

Alerting Communications

- UHF line-of-sight voice transceiver
  - CP to the flight line-a few miles
  - Single channel, not hopped or encrypted
- Remote Sounding Units (RSUs)
  - Hard wired to CP
- Voice Pagers

CMU: Terminal Electronics

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- Hardened communications electronics for all the communications
  - Operator interfaces, control and baseband
  - Remotable
  - Future capabilities should include intelligence data transfer, video teleconferencing, NIPRNet and SIPRNet connectivity
- Effective, flexible and expandable

Operator interface

- Computer interface with extensive message handling capability
  - Display and Print
  - Alerting on message receipt or alarms
  - Logging
  - Fail-safe/no single failure mode
  - Security certified and SIOP accredited
  - Duplicate EAM elimination
- Also controls Communications Functions

Architectural View

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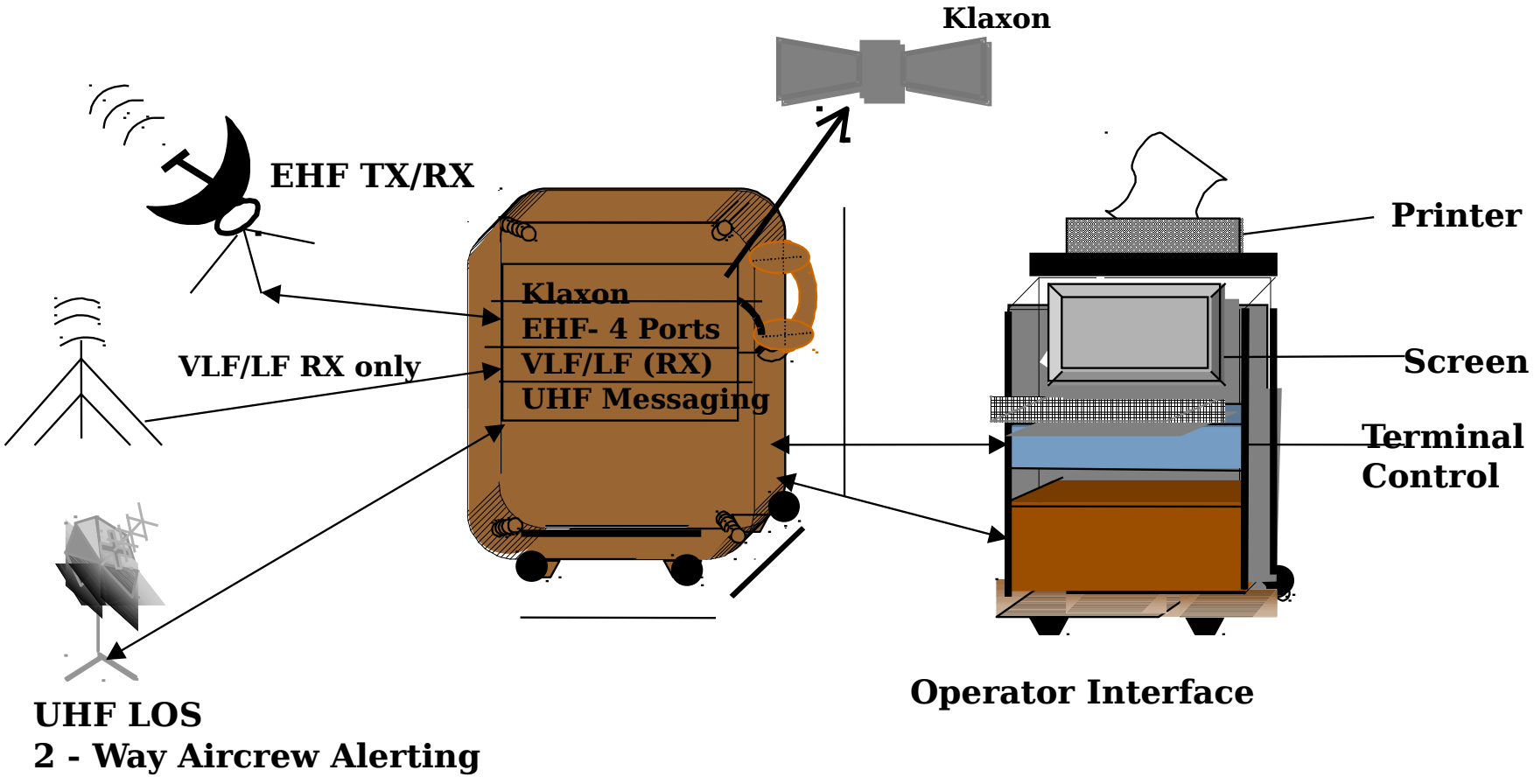
Transportable GEMS



Integration

- A single integrated operator interface
  - For message handling
  - For communications control
- Electronics easily transported and set up
- Common equipment fixed or transportable?
  - For training ease and manpower reduction
- Our question to Industry: How much integration makes sense?
  - And when in the development process?

Terminal Quantities

- ORD V 5.1 Tables 6-1 to 6.4 contain details
- Total GEMS Terminals: 123
  - 54 Fixed
  - 69 Transportable
- All GEMS terminals will have EHF
  - 42 will have VLF/LF terminals
  - 95 will have aircrew alerting
- RSUs and Pager quantities are classified

Modular and Interchangeable

- Can have any combination of capabilities
- No one capability dependent on any other
- No capability lost by a failure of another

Remoting Requirements

- V 5.1 Baseband equipment can be up to 2 miles from the Antenna (10 mi obj)
  - Operator interface 500 ft from baseband equipment (1500 ft obj.)
  - RSU 5 mi from OIU (10 mi. obj)
- Transportable GEMS Antenna 100 ft from baseband equipment (500 ft. obj.)

Hardening

- HEMP, and fallout hardening are required
  - Also Biological and Chemical, some units
- HEMP hardening can be added to COTS
  - By shielding and filtering; similar for BC
- Fallout protection requires piece-part analysis, test, and parts control
  - Generally need to design before production
  - Could stretch schedule, eliminate COTS
- Suggestions from Industry desired

Upset

- Blackout effects and HEMP
  - Recovery Vs Operate through
- The EHF terminal must incorporate scintillation processing
- One nuclear detonation can expose CONUS
  - Multiple HEMP events may be experienced
  - Indicates an operate through requirement
  - Or very fast recovery- seconds

Hardness Surveillance

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- The ability to perform Hardness Surveillance testing in the field is required
  - Including terminal electronics and antennas, operator interface, and the RSUs

Power Sources

- V 5.1
- Commercial all common varieties
- Internal Battery backup for 7 days ops
- Mission support retain data 30 days w/o backup power
  - Crypto variables 10 days w/o backup
- Pagers good for 24 hours
- Klaxons 30 days

Transportability

- Some units disperse on aircraft and some on motor vehicles
- V.5 Specifies one standard air cargo pallet
  - 104” x 84” x 96”
  - 2-person lift transit cases
  - Set up time less than 2 hrs, 1 hr obj.
- Some Users may want a more highly integrated unit
- Industry suggestions are solicited

Security

- Security requirements are driven by the red side of communications channels
  - Top Secret SIOP; SCI- how many categories?
  - Transportable GEMS will need removable magnetic memory
  - Will drive development, maintenance facility
- TEMPEST
  - Will depend on the User's zone of control and connectivity

Sparing

- The ORD specifies availability which allows a Logistic Support Analysis to determine sparing based on the design
- The GEMS must operate through the endurance period - see 6811.01A
  - All major functions
- Some units may want 100% spares
- Industry comments are solicited
  - What availability should we expect? All components?

Phasing Development and Production

- V 5.0 endorses spiral delivery EHF + Alerting, AEHF, VLF/LF; V 5.1 this may be reconsidered
- However, will starting production in 05-06 preclude ordering a fully integrated and tested capability in the first spiral?
  - User/Industry feedback will determine
- What does Industry recommend
  - Spiral content
  - Extent of integration
  - Test requirements

Support

- Basically,deployment of GEMS requires
  - All development and operational tests complete
    - IOT&E vice Operational Assessments
  - All training and training materials complete
  - Maintainability verified
  - Initial spares available
  - Organizational and Depot support in place
  - TO/TMs provided and approved

GEMS Business Strategy Activities

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- Document principal Technical Requirements to support the Concept of Operations
- Identify component availability that GEMS needs
- Define the hardening program
- Define integration program
- Define the Security, Accreditation and Test program
- Define Supportability requirements
- Identify program Risks and mitigation strategies
- Make program recommendations to the ASP
  - Acquisition strategy
  - Spiral definitions

Questions for Industry

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- Issues with ORD?
- Risks?
- Existing technology?
- Suggested spirals?
- Transportability?

Industry Reports

- Deadline: emailed or post-marked 9 Sep 2002
- Format
  - No more than 10 double-spaced, single sided pages (not including cover page, table of contents)
  - 10- or 12-point standard font
- Content
  - Qualifications for meeting GEMS requirements
  - Existing/prior DoD contracts
  - Capabilities (hardware and/or software)
  - Information/suggestions relative to potential acquisition
- Submit response to contracting officer
  - **kathy.viano@hanscom.af.mil**
  - Kathy Viano, ESC/NDK, Bldg 1618, 11 Eglin St, Hanscom AFB, MA 01731

Future Contact/Questions

- HERBB online question form

- Submit questions to GEMS Program Office organizational account: **gems@hanscom.af.mil**
  - Question will be automatically forwarded to contracting officer, buyer, and program management staff

Current Status / Road Ahead

SND C2 SPO

- Acquisition strategy planning ongoing
- Market Research
  - Industry Days -- 6-8 Aug 2002
  - RFI Industry Feedback -- Sep 2002
- Business Strategy -- Jul-Dec 2002
- Risk Assessment -- Oct 2002
- Next RFI/call to industry ~Mar 2003


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Q&A